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UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
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INFORMATION CIRCULAR

MARKETING TALC, PYROPHYLLITE, AND GROUND SOAPSTONE

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BERTRAND L. JOHNSON

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

MARKETING TALC, PYROPHYLLITE, AND GROUND SOAPSTONE[1]

By Bertrand L. Johnson[2]

DEFINITIONS

Pure talc is a hydrous magnesium silicate ($Mg_3Si_4O_{10}(OH)_2$). Pyrophyllite, although it resembles talc in certain physical properties and uses, is a hydrous aluminum silicate ($Al_2Si_4O_{10}(OH)_2$) - like kaolin, except that kaolin has a somewhat different composition ($Al_2Si_2O_5(OH)_4$) and structure. Soapstone can be considered essentially an impure talc and when pulverized is used for many of the same purposes as talc. Massive, compact varieties of talc often are called steatite.

PROPERTIES

Talc and pyrophyllite are characterized by their softness (hardness on Mohs' scale, 1), their greasy feel, pearly luster, white color, and perfect basal cleavage. They have similar crystal structures, and this similarity explains the close resemblance of the two minerals in physical and chemical properties. Talc is a good electrical insulator, resists the action of most acids and alkalies, and has an exceptional heat-retaining capacity. Its specific gravity is about 2.7.

Most commercial talcs are not pure but are mixtures of talc with other minerals occurring in the talc deposits and usually left in the product. Accessory minerals include dolomite, calcite, magnesite, serpentine, and tremolite with occasional chromite, magnetite, and also traces of nickel and other constituents of basic igneous rocks. Talcs produced in different localities differ in mineral contents and in physical as well as chemical properties. Some differences may exist in talcs from different parts of the same deposit.

Commercial talcs are classified as "hard" and "soft", "fibrous" and "flake", as well as according to screen size and color. "Fibrous" talc owes its structure mainly to needlelike tremolite and gritty talcs to grains of dolomite or magnesite. Dark talcs are likely to contain admixed serpentine or chlorite. Flake and soft talcs only are relatively pure.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7080."

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OCCURRENCE

Commercial deposits of talc are found in much-altered ultrabasic intrusions and in metamorphosed limestones. In the United States they occur in the pre-Cambrian limestones of the Adirondacks, in the ancient metamorphosed sediments and ultrabasic intrusives of the Piedmont Plateau, and in the much folded and metamorphosed mountainous belt of the Pacific coast. The only commercial pyrophyllite deposits in the United States are hydrothermal metasomatic replacements of dacitic and rhyolitic volcanic rocks in central North Carolina.

USES

Except in the ceramic industry most of the uses of talc, pyrophyllite, and ground soapstone depend on physical other than chemical properties, and the minerals are not subject in their utilization to temperatures high enough to decompose them and initiate chemical changes.

Talc serves the paint industry principally as an extender, although in some paints it is the principal pigment. The fibrous talc (asbestine), a mixture of tremolite fibers and talc, is used largely in cold-water paint, the fibers of tremolite bonding the paint film. Flake talc and pyrophyllite are also incorporated in paints.

White, fine-grained talcs are used for loading the better grades of paper. The low-priced, off-color, low-grade talcs and pyrophyllite are used to form an inert, fireproof, weather-resisting coating for roofing papers.

Talc and pyrophyllite enter the ceramic industry in considerable quantities. Calcined talc ("lava") meets the special requirements of the electrical and refractory industries, being sold either as calcined sawed and machined block material or compounded from talc and silicate of soda, and then pressed into blocks and calcined. An important use of talc in the ceramic industry is in the preparation of sagger bodies. Considerable quantities of talc are sold to wall-tile and whiteware manufacturers, who also utilize pyrophyllite.

Various industries needing fillers utilize talc, pyrophyllite, and ground soapstone. Rubber manufacturers are said to take the largest amounts for use either as a filler or as a lubricant. Smaller quantities are used by the makers of asbestos goods, floorings, wall plasters, insecticides, ropes, and plastics.

The lubricating properties of talc, pyrophyllite, and ground soapstone are utilized in many industries. Manufacturers of cup greases, foundry castings, rubber tires, bottles, and candy and users of box-nailing machinery and dies of various kinds consume small quantities.

Talc is the principal base in various toilet preparations, but this use is very small compared with total talc consumption. Some pyrophyllite has been used. Fine, pure-white material is required for this use.

Talc is used for abrasive or polishing purposes where the material to be polished is soft, such as peanuts or coffee beans, or where the dirt is to be removed from a soft underlying material, such as marble or lacquer.

PRODUCTION

The annual world production of over four hundred thousand tons of talc, pyrophyllite, and ground soapstone comes from many countries, principally, however, from highly industrialized ones. Nonindustrial countries produce only high-grade talc in small quantities for a limited market.

In the United States, Canada, and Germany, many uses have been found for the lower grades. In France and Italy the chief product is high-grade talc for toilet use and massive talc for "lava" manufacture, but some use is made of the lower grades. In most of the other producing countries there is little or no market for anything but the highest grades. Thus, India, Brazil, Japan, and Spain have produced only small quantities.

The United States has for many years been the outstanding source of these materials, producing in recent years over one-third of the world total and two to three times as much as any other country. France, China (including Manchuria), Italy, Norway, and Austria usually followed in the order given.

The United States produces most of its requirements in talc. This production comes from the eastern belt along the Atlantic coast from Vermont to Georgia, and from the Pacific Coast States of California and Washington. The eastern belt is by far the largest producing region, with New York the leading producing State. Production of pyrophyllite is confined to North Carolina.

Although there are usually 30 to 40 producers of talc, pyrophyllite, and ground soapstone in the United States in a given year, over half of the domestic production comes from not more than half a dozen concerns.

SALES

In the 3-1/2 decades from 1880 to the World War, the total sales of talc, pyrophyllite, and ground soapstone rose from a few thousand tons a year in the early eighties to annual sales of nearly 200,000 tons. In the two decades since the World War, however, sales of these commodities have risen a little above the 200,000-ton level, but only on the crests of booms - in 1920, 1928 and 1929, and in 1936, 1937, and 1938. Increased use of talc in the ceramic industry during the last boom period carried the sales in 1937 to a new all-time record height of 229,999 short tons.

Prior to the recent depression the bulk of these materials came from New York and Vermont, but since 1932 increasing quantities have come from California and North Carolina. New York is still the leading producing State. North Carolina has furnished all the pyrophyllite. The following table shows the sales of domestically produced talc, pyrophyllite, and ground soapstone, by classes, for the past 11 years (1928-38), covering the cycle from the crest of the 1929 boom to that of 1937.

Sales of domestic talc, pyrophyllite, and ground soapstone, 1928-1938, by classes

Year	Crude		Sawed and manufactured		Ground		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
1928	6,360	$48,031	936	$70,394	195,680	$2,419,569	202,976	$2,537,994
1929	11,228	87,820	473	140,928	208,082	2,399,914	219,783	2,628,662
1930	4,972	48,913	385	90,370	174,028	1,969,055	179,385	2,108,338
1931	6,673	47,382	181	51,740	156,898	1,753,350	163,752	1,852,472
1932	5,635	51,657	107	17,749	117,479	1,292,227	123,221	1,361,633
1933	5,985	46,553	246	31,686	159,792	1,653,643	166,023	1,731,882
1934	8,767	55,659	174	46,918	129,564	1,346,108	138,505	1,448,685
1935	10,725	57,259	841	63,211	161,150	1,727,585	172,716	1,848,055
1936	10,910	59,556	618	90,542	204,663	2,193,073	216,191	2,343,171
1937	11,087	52,750	1,101	111,680	217,811	2,397,323	229,999	2,561,753
1938	13,498	72,845	1,729	70,268	197,548	2,159,447	212,775	2,302,560

Only a few thousand tons of domestic crude talc a year (3,956 to 8,878 short tons in recent years) goes to foreign markets, but there is an export trade in talcum powders valued at half a million to a million dollars a year.

MARKETS

The domestic market for talc, pyrophyllite, and ground soapstone is the largest in the world. It not only consumes most of the large domestic production of the crude materials but also imports some hundreds of tons annually. In 1933, a depression year, the domestic industries absorbed 162,315 short tons of talc, pyrophyllite, and ground soapstone, principally of domestic orig and in 1937, during the following boom, they took 221,445 tons.

This material is distributed as (1) crude talc, (2) sawed or manufactured talc, or (3) ground talc. The market takes 98 percent of its consumption in the ground form. Less than 0.50 percent is in the form of sawed and manufactured material. The balance is in the crude state. The following table shows the extent of the demand for each of these types of material in 1937.

Disposal of crude talc, pyrophyllite, and ground soapstone in domestic market in 1937

Classification	Short tons
Domestic crude sold	2,209
Domestic crude sold as sawed and manufactured	1,101
Domestic crude sold ground	217,811
Foreign crude imported	324
Total	221,445

The largest markets for industrial-grade talcs are in the States east of the Mississippi River north of Virginia. California talcs of industrial grade are restricted to the Western States, high freight rates prohibiting competition in the eastern area.

There are markets for talc, pyrophyllite and ground soapstone in many different industries, principally, however, in the paint, paper, ceramics, rubber, and roofing industries, which in 1938 took 77 percent of the total domestic sales. There are smaller outlets in the toilet preparations, fillers, foundry facing, and crayon industries. The electrical and refractory industries take calcined talc.

The following table shows the quantities and relative percentages of talc, pyrophyllite, and ground soapstone sold to the leading consuming industries, as reported by the producing companies.

Talc, pyrophyllite, and ground soapstone sold in the United States, 1936-1938, by industries

Industries	1936		1937		1938	
	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total
Paint	56,613	26	59,660	26	53,506	25
Ceramics	19,073	9	29,793	13	29,590	14
Paper	30,996	14	32,127	14	27,329	13
Roofing	25,160	12	23,551	10	27,607	13
Rubber	27,076	13	26,941	12	25,374	12
Toilet preparations.	4,293	2	4,340	2	5,970	3
Foundry facings	2,781	1	3,228	1	2,511	1
Other	25,091	12	28,265	12	20,732	10
Not reported	25,108	11	22,094	10	20,156	9
Total	216,191	100	229,999	100	212,775	100

The markets for talc, pyrophyllite, and ground soapstone are shifting. For many years the paint, paper, rubber, and roll-roofing industries, in about the order named, were the principal consumers. In 1938, the ceramic industry, which formerly took a negligible quantity of those materials, took 14 percent of the total and ranked second. The paint industry now comprises only about a quarter of the total market instead of one-half as formerly. The increased ceramic demand is due to the greater use of talc as a constituent of glazed wall-tile bodies.

Most ground talc is sold today on the basis of grain shape and size, and color. Talcs are graded in sizes ranging from 20 to 325 mesh; in flake or fibrous shapes; and from white to dark in color. Only a few industries require talc in carload lots; the remainder are satisfied with from a few pounds to 4 or 5 tons a year.

PRICES

Talc is a relatively low-priced commodity. The average value per ton of all grades of talc, pyrophyllite, and ground soapstone, f.o.b. mills, in the last 10 years has ranged between $10.43 and $12.50 a short ton, dropping from the latter figure in 1928 to the former in 1933 and rising to $11.14 a ton in 1937. Talcs suitable for manufacturing into blanks for insulators and gas burner tips ("lava-grade" talc) and for making crayons and pencils command the highest prices. High-grade "lava talc", lumps, may sell for as much as 6 cents a pound, and the various forms of sawed talc are said to sell generally for at least $100 to $150 a ton, but some of these materials are reported at times to have sold as high as $800 a ton.

Prices on other kinds of domestic talc, pyrophyllite, and ground soapstone are generally much lower. Virginia crude is quoted at $4 a ton. Domestic ground talcs, except toilet grade, normally range in price between $4 and $20 a ton, according to quality and fineness. Much domestic roofing talc, 20 to 50 mesh, is said to have been sold as low as $4 a ton f.o.b. mill. Quotations on finer-ground domestic talcs, f.o.b. works, carload lots, are about as follows in 1939:

Virginia talc, 200 mesh	$4.75 - $5.50
Virginia talc, 325 mesh	$6.25 - $7.00
Georgia talc, 200 mesh	$6.00
Georgia talc, 300 mesh	$7.50 - $10.00
Vermont talc, 200 mesh	$8.00 - $14.00
New York talc, 325 mesh	$11.00 - $17.00
California talc	$17.00 - $20.00

Ground soapstone is generally quoted around $5 a ton for 200 mesh and up to $7 a ton for 325 mesh f.o.b. Virginia plant. Vermont soapstone quotations f.o.b. plant are about $10 to $12 a ton.

Ground pyrophyllite quotations range from $7.50 a ton in carload lots for some grades 200 mesh to $12 a ton for standard grade 325 mesh.

Imported talcs range from $20 (or less) to as much as $85 a ton, the higher prices being for Italian and French talc. French talc sells in U. S., ex-dock, from $23 to $60, and Italian talc from $60 to $85. Manchurian talc sells in the United States for $30 to $40 a ton, a little off-color material selling as low as $20.

Current price quotations of talc, pyrophyllite, and ground soapstone ar carried in the following trade journals:

1. Oil, Paint, and Drug Reporter (weekly)
2. Engineering and Mining Journal (monthly)
3. Chemical Industries (monthly)
4. Chemical and Metallurgical Engineering (monthly)
5. Canadian Chemistry and Process Industries (monthly)

Soapstone quotations are carried in Chemical and Metallurgical Engineering and pyrophyllite quotations in the Oil, Paint, and Drug Reporter. The basis for the quotations and also the prices vary considerably in the different journals.

No current prices on crude (except Virginia crude) or sawed and manufactured talc or pyrophyllite are carried in the trade journals, quotations being obtainable only from producers, manufacturers, or dealers in these materials.

BUYERS OF UNMANUFACTURED TALC, PYROPHYLLITE, AND SOAPSTONE

Lava Grade

California

W. K. Thompson, 1949 North Vermont Ave., Los Angeles.

Maryland

Maryland Lava Co., Bel Air.

New York

Hammill-Gillespie Inc., 225 Broadway, New York.
International Pulp Co., 41 Park Row, New York.
M. Kirchberger & Co., Inc., 14th Ave. and 37th St., Brooklyn.
Union Talc Co., 147 Nassau St., New York.
Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York.

Tennessee

American Lava Corporation, 1429 William St., Chattanooga.
D. M. Steward, Chattanooga.

Virginia

F. G. Hoffmann, Claremont.

For Grinding

California

Henry Rising & Co., 424 S. Broadway, Los Angeles.
W. K. Thompson, 1949 North Vermont Ave., Los Angeles.
Western Talc Co., 1901 East Slauson Ave., Los Angeles.

Illinois

Superior Flake Graphite Co., 1531 1st Nat'l. Bank Bldg., Chicago.

Maryland

Clinchfield Sand & Feldspar Co., Hearst Tower Bldg., Baltimore.

New York

Hammill-Gillespie Inc., 225 Broadway, New York.
Innis, Speiden & Co., 117 Liberty St., New York.
R. T. Vanderbilt Co., 230 Park Ave., New York.
Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York.

Oregon

Miller Products Co., Portland.

Virginia

Blue Ridge Talc Co., Henry.

Wisconsin

W. E. Krause, 8136 Milwaukee Ave., Wauwatosa.

BUYERS OF SAWED AND MANUFACTURED TALC, PYROPHYLLITE, AND SOAPSTONE

California

W. K. Thompson, 1949 North Vermont Ave., Los Angeles.

Illinois

F. E. Schundler Co., Inc., 606 Railroad St., Joliet.

Maryland

Clinchfield Sand & Feldspar Co., Hearst Tower Bldg., Baltimore.

New York

Chrystal Co., Inc., 13 Park Place, New York.
Innis, Speiden & Co., 117 Liberty St., New York.
International Pulp Co., 41 Park Row, New York.
Minerals & Insulation Corporation, 139 Spring St., New York.
Smith Chemical & Color Co., Inc., 55 John St., Brooklyn.
Union Talc Co., 147 Nassau St., New York.
R. T. Vanderbilt Co., 230 Park Ave., New York.
Whittaker, Clark & Daniels Inc., 260 West Broadway, New York.

North Carolina

Nantahala Talc & Limestone Co., Andrews.

Pennsylvania

Enterprise White Clay Co., 139 South 3d. St., Philadelphia.
Chas. A. Wagner Co., Inc., 811 Callowhill St., Philadelphia.

Tennessee

D. M. Steward Mfg. Co., Chattanooga.

Virginia

F. G. Hoffman, Claremont.

BUYERS OF GROUND TALC, PYROPHYLLITE, AND SOAPSTONE

California

Braun-Knecht-Heimann Co., Ltd., San Francisco.
Commercial Minerals Co., San Francisco.
W. K. Thompson, 1949 North Vermont Ave., Los Angeles.

Georgia

Thompson, Weinmann & Co., Cartersville.

Illinois

Amalgamated Roofing Co., Clearing.
Armour Soap Works, 1355 West 31st St., Chicago.
The Lehon Co., 4425 South Oakley Ave., Chicago.

Indiana

National Tile Co., Inc., Anderson.

Maryland

Clinchfield Sand & Feldspar Co., Hearst Tower Bldg., Baltimore.
Maryland Lava Co., Bel Air.
E. M. & F. Waldo Inc., Muirkirk.

Massachusetts

Davidson Rubber Co., 50 Brighton St., Charlestown, Boston.
The Fisk Rubber Corporation, Chicopee Falls.

Missouri

Cupples Co., 7th & Spruce St., St. Louis.

New Jersey

American Oil & Supply Co., Trenton.
Merck & Co., Inc., 1935 Kerrigan Road, Rahway.

New York

H. J. Baker & Bro., 271 Madison Ave., New York.
Certain-teed Products Corporation, 101 East 41st St., New York.
Chrystal Co., Inc., 13 Park Place, New York.
Hammill-Gillespie Inc., 225 Broadway, New York.
Innis, Speiden & Co., 117 Liberty St., New York.
International Pulp Co., 41 Park Row, New York.
Larkin Co., Inc. (J. A. Handy), 680 Seneca St., Buffalo.
Minerals & Insulation Corporation, 139 Spring St., New York.
National Mfg. Corporation, Tonawanda.
C. J. Osborne Co., 132 Nassau St., New York.
Smith Chemical & Color Co., Inc., 55 John St., Brooklyn.
L. A. Solomon & Bro., 216 Pearl St., New York.
Special Service Flooring Corporation, 520 Waverly Ave., Mamaroneck.
Union Talc Co., 147 Nassau St., New York.
R. T. Vanderbilt Co., 230 Park Ave., New York.
Whittaker, Clark & Daniels Inc., 260 West Broadway, New York.
Wishnick Tumpeer Inc., 295 Madison Ave., at 41st St., New York.

Ohio

Philip Carey Mfg. Co., Lockland, Cincinnati.
Harshaw Chemical Co., 1945 East 97th St., Cleveland.
E. S. Jackson & Co., 224 East 2d St., Cincinnati.
Weaver Wall Co., Brookpark & State Roads, Cleveland.

Oregon

Miller Products Co., Portland.

Pennsylvania

Chemical & Pigment Co., Scranton.
Enterprise White Clay Co., 139 South 3d St., Philadelphia.
Hammermill Paper Co., Erie.
Chas. A. Wagner Co., Inc., 811 Callowhill St., Philadelphia.

Tennessee

American Lava Corporation, 1429 William St., Chattanooga.
D. M. Steward Mfg. Co., Chattanooga.

Virginia

Blue Ridge Talc Co., Inc., Henry.
F. G. Hoffman, Claremont.

Original from THE OHIO STATE UNIVERSITY

Wisconsin

W. E. Krause, 8136 Milwaukee Ave., Wauwatosa.

UNCLASSIFIED REPORTED BUYERS OF TALC, PYROPHYLLITE, OR GROUND SOAPSTONE

California

Blue Star Mines, Ltd., 840 San Julian St., Los Angeles.
Pacific Coast Talc Co., 2149 Bay St., Los Angeles.

Illinois

Brunswick-Balke-Collender Co., 623 S. Wabash Ave., Chicago.
S. Obermayer Co., 2559 West 18th St., Chicago.
U. S. Gypsum Co., 300 West Adams St., Chicago.

Maryland

Harford Talc and Quartz Co., Towson.

Massachusetts

Hood Rubber Co., Inc., Watertown.
E. & F. King & Co., Inc., 405 Atlantic Ave., Boston.

Michigan

Paper Makers Chemical Corporation, Kalamazoo.

Missouri

American Asphalt Roof Corporation, 15th & Blue River, Kansas City.

New Jersey

W. A. Allen, Pittstown.
Barber Asphalt Co., 1935 Lewis St., Maurer.
Joseph Dixon Crucible Co., Jersey City.
Franco-American Chemical Works, Inc., Carlstadt.

New York

Binney & Smith Co., 44 East 43d St., New York.
Carbola Chemical Co. Inc., 318 Harris Road, Natural Bridge.
General Mineral Co., 90-104 Spring St., New York.
H. A. Golwynne, Golwynne Magnesia & Magnesite Corporation, 1532 Chrysler Bldg., New York.
Adolphe Hurst & Co., 328 West 42d St., New York.
Chas. Mathieu, Inc., 120 Liberty St., New York.
Reichard-Coulston Inc., 95 Madison Ave., New York.

Ruberoid Co., 502 5th Ave., New York.
W. H. Scheel, Inc., Water & John Sts., New York.
U. S. Talc Co., 147 Nassau St., New York.
W. H. Whittaker Co., 250 Front St., New York.

Ohio

R. L. Cawood Co., East Liverpool
B. F. Goodrich Co., 450 South Main St., Akron.
Goodyear Tire & Rubber Co., Akron.

Pennsylvania

Rock Products Co., Easton.
C. K. Williams Co., 132 Bushkill Creek, Easton.

BUYERS OF SOAPSTONE

California

Commercial Minerals Co., San Francisco.
Pacific Minerals Co. Ltd., Richmond.

Illinois (Chicago)

Jas. B. Clow & Sons, 2338 So. Western Ave.
Jas. H. Rhodes & Co., 153 W. Austin Avenue.

Michigan

Cummings, Moore Graphite Co., 1646 Green St., Detroit.

Missouri

D. C. Adams Crayon Mfg. Co., 125 Market St., St. Louis.

New York

Insulation Mfg. Co. Inc., 15 New York Ave., Brooklyn.

NEW YORK CITY

The Barrett Co., 40 Rector St. (soapstone talc)
Binney & Smith Co., 44 East 43rd St.
Chrystal Co. Inc., 13 Park Place.
General Mineral Co., 96-104 Spring St.
Thomas Stanley, Inc., 473 Canal St.

North Carolina

Georgia Talc Co., Asheville.

Ohio

Goodyear Tire & Rubber Co., Akron.

Pennsylvania

Chas. A. Wagner Co. Inc., 811 Callowhill, Philadelphia.

Tennessee

D. M. Steward Mfg. Co., Chattanooga.

Virginia

F. G. Hoffman, Claremont.